

Curriculum Vitae

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Personal

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Chronology

08/2003 – Present : Research Scientist, Physics and Astronomy, Univ. of Rochester
05/2002 - 07/2003 : Research Associate, Physics and Astronomy, Univ. of Rochester
05/1999 - 04/2002 : Instructor Fellow, Physics and Astronomy, Univ. of Rochester
09/1993 - 02/1999 : Ph.D., Physics, Korea University/Fermilab
03/1991 - 02/1993 : M.S., Physics, Korea University
03/1987 - 02/1991 : B.S., Physics, Korea University

Experience

Research Scientist at the University of Rochester

Aug. 2003 – Present

Physics Analysis:

I am studying the mass dependence of **forward-backward charge asymmetry**, A_{FB} , and production cross section, $d\sigma/dM$, for e^+e^- pairs with mass $M(ee) > 50 \text{ GeV}/c^2$. The data sample consists of 4.1fb^{-1} CDF II data. We plan to extract the exact electroweak couplings for the quarks and leptons to the vector boson.

I have searched **a charged Higgs** in the top decays. We use the top mass template used for

CDF top mass measurement and look for a resonance in the invariant mass distribution of two jets in the lepton+jets sample of $t\bar{t}$ candidates. We observe no evidence of charged Higgs bosons in top quark decays and set the 95% upper limits on the top quark decay branching ratio for charged Higgs boson masses of 60 to 150 GeV/c². The results are accepted by **Phys. Rev. Lett. Aug. (2009)**.

I have studied on the **s quark distribution** in the proton. By looking at W+Charm events in the CDF data, we try to understand the s quark distribution in the proton at the Tevatron. This will give an important (first) input to constrain the s quark in the PDF.

I have **tuned electron responses** in the CDF simulation. There are some discrepancies in the electron responses between simulation and data. With better tuning electron responses in the simulation, it will reduce the jet energy scale uncertainty, especially of the neutral response in the jets. This tuning will benefit many physics topics, especially in Top and QCD.

I have measured **the W boson production asymmetry** using new analysis technique. Because the neutrino from W decay is not detected in the Collider Detector at Fermilab (CDF), we partially reconstruct W rapidity using measured lepton momentum, missing ET, and the given world average of W mass. The W production asymmetry is highly sensitive to the parton distributions. This measurement is published in **Phys. Rev. Lett. 102, 181801 (2009)**

I have measured rapidity (y) distribution of electron pairs in the γ^*/Z decays. The rapidity distribution is measured over the full kinematic range for events with the invariant mass range 66 to 116 GeV/c² and is compared with theory. The measurement is to better constrain Parton Distribution Functions at large x. The results are submitted to **Phys. Rev. Lett. Aug. (2009)**.

I had been serving as **a co-convener of Pentaquark Task Force** and **a co-leader of Jet Task Force** at CDF. In addition, I am currently serving as a quality assurance physicist for 6-channel QIE boards for CMS hadron calorimeter.

- **A co-convener of Pentaquark Task Force at CDF**

A pentaquark is an exotic particle with a narrow bound state of four quarks and an anti-quark. There have been many interpretations and predictions for the existence of this exotic state. Discovery of such exotic states will have a significant impact on furthering the understanding of QCD multi-quark systems. We are searching for many possible light and heavy pentaquark states at CDF. I had served as a co-convener of this task force during

03/2004 ~ 09/2005.

- **A co-leader of Jet Task Force at CDF**

I am involved in the CDF detector simulation efforts to tune up calorimeters in all regions to the data. The energy scale is the most important factor to determine TOP quark mass along with other measurements using calorimeter information. I also had been appointed as a co-leader of this task force from March 2004 until February 2005.

Hardware and Electronics

- **6-channel QIE board for CMS Hadron Calorimeter (HB/HE/HO/HF)**

QIE is an acronym for the functions of the ASIC, Q(charge) I(integration) and E(encode). A large dynamic range is accomplished through a multi-range technique. This chip is the most advanced electronics chip and it will be used to determine energy in the CMS calorimeters. Energy measurement is the most important quantity to discover new particles. I have been assigned as a quality assurance physicist for 6-channel QIE boards for CMS hadron calorimeter from January 2004.

Research Associate at the University of Rochester

May. 1999 – July 2003

Physics Analysis :

I have measured the mass dependence of forward-backward charge asymmetry, A_{fb} , and production cross section, $d\sigma/dM$, for e^+e^- pairs with mass $M(ee) > 40 \text{ GeV}/c^2$. The data sample consists of 108 pb⁻¹ of ppbar collisions at $\sqrt{s}=1.8 \text{ TeV}$ taken by the CDF during 1992-1995. The measured asymmetry and cross section are compared with the predictions of the Standard Model and a model with an extra Z' gauge boson. The results are published in **Phys. Rev. Lett** **87**, 131802 (2001).

I have studied dielectron rapidity (y) distribution from γ^*/Z decays in the Z mass range, $66 < M(ee) < 116 \text{ GeV}/c^2$, and the high mass range, $116 < M(ee) \text{ GeV}/c^2$. The rapidity distribution is measured up to $|\eta| = 2.8$. The data sample consists of 108 pb⁻¹ of ppbar collisions at $\sqrt{s}=1.8 \text{ TeV}$ taken by the CDF during 1992-1995. The total and differential cross sections are compared with the Next-Leading-Order (NLO) Quantum Chromo-dynamics (QCD) calculation using the MRST99 parton distribution function. These studies are published in **Phys. Rev. D****63**, 011101(R), 2000.

Software :

- **CDF Level3 Trigger**

I have written CDF level3 Trigger Objects in C++ language. Those are **Level3ModuleMap**, **Level3ModuleResults**, and **Level3ModuleSummary**. Level3ModuleMap is a mapping class of Paths, Modules, and Streams of CDF Level 3 Triggers and is attached to the begin run record of events. Level3ModuleResults consists of Level 3 Module information of tried, passed, and CPU time and is attached to the event record of each event. Level3ModuleSummary contains Level 3 summary information of Modules and Paths and is shown in the end run record of events. Based on these three objects of Level 3 Triggers in the CDF Run II, I have written Level 3 Trigger monitoring programs and incorporated them into the TrigMon of CDF online Consumer package.

- **CDF Plug event display**

I have written an event display program for CDF plug calorimeters, Plug Electromagnetic Calorimeter (PEM), Plug Hadron Calorimeter (PHA), Plug Pre-Radiator (PPR), and Plug ShowerMax (PES) detectors. This package is incorporated into CDF main event display package. This work is based on C++ language and **root** package.

- **CMS Hadron Calorimeter Quality control**

I have written various programs and scripts for quality controls of fibers and mega-tiles of CMS hadron calorimeter. Those are to analysis data, make plots, write summary outputs, and make ntuples for further analysis. These are based on the **Fortran** language and the **Pearl** script.

Hardware :

- **CMS Hadron Calorimeter**

I have been assigned to a final quality assurance physicist for mega-tiles of CMS hadron calorimeter. The light yields from calibration source data (collimated and wire) and fiber scans with UV lamp are checked. The final dimensions of mega-tile, black line widths, and etc are measured and assured. Have worked on optical connectors and polishing blocks to ensure good quality of pin alignments and angles. Pin alignments and angles are important factors for light transmission.

- **CDF Plug Calorimeter**

I have worked on the measurement of noise level of Hadron ASD board.

- **Online Monitoring**

I have participated in monitoring CDF data acquisition since 2001. I am currently being involved in data reconstruction and reduction processes.

Research Assistant of Korea University/Guest Scientist of Fermilab

Jan. 1994 - Apr. 1999

I studied Fermilab E687 data of Λ_c^+ 's various decay modes, $nK^+\pi^+\pi^-$, $p\pi^+\pi^-$, $p\pi^+\pi^-\pi^+\pi^-$, $\Lambda^0\pi^+\pi^-\pi^+$, $\Xi^-K^+\pi^+$, and $\Xi^{*0}(1530)K^+$. Have studied Ξ_c^0 semileptonic decay modes, $\Xi^- \mu^+ X$ and $\Xi^- e^+ X$ using Fermilab E687 data to measure branching ratios to $\Xi^- \pi^+$. My studies indicated that the Ξ_c^0 would decay semileptonically to modes other than $\Xi^- l^+ \nu$, such as $\Xi^- (n)\pi^0 l^+ \nu$. The large statistical error hampers the detailed study of exclusive Ξ_c^0 semileptonic decay modes further.

Hardware:

- **Hadron Calorimeter**

I deeply involved in building and testing of the Hadron Calorimeter (tile/fiber sampling calorimeter) for the Fermilab E831 (FOCUS) experiment. The Hadron Calorimeter was primary designed to provide a trigger mechanism (1st level trigger) that selects hadronic events and rejects electromagnetic background events like e^+e^- pairs by requiring a certain minimum hadronic energy. I had a sole responsibility for radioactive source (wire source with Co^{60}) calibration and repair/replace of the damaged or low efficiency photo-multipliers. Have studied photoelectron yield with different tile sizes and grove depths. I have been involved in most of construction processes of the calorimeter including cutting, polishing and splicing of fibers, testing spliced fibers, checking and mounting photo tubes, measuring tile by tile cross talks, and calibrations with muons and pions. Have also supervised building procedures of the calorimeter. Have written on-line monitoring program of hadron calorimeter which use Fastbus 1881M as a readout system. The calorimeter has been successfully operated during Fermilab 1996-97 fixed target runs with using the total hadronic energy trigger. The performance of the FOCUS hadron calorimeter was reported to **NIM A409, 561 (1998)**.

- **Multi-Wire Proportional Chamber**

I built a small prototype Multi-Wire Proportional Chamber (MWPC) and studied gas mixtures for MWPC. Based on these studies, FOCUS collaboration used the Ar-Ethane (65%-35%) gas mixture during Fermilab 1996-97 fixed target runs.

- **Trigger Counters**

I participated in checking light leakage and setting threshold for FOCUS main trigger counters.

- **Online Monitoring**

I participated in monitoring FOCUS data acquisition during whole 1996-1997 runs. Also have been involved in data reconstruction and reduction processes.

Research Assistant of Korea University/Guest Scientist of KEK

Jan. 1992 - Oct. 1992

I installed KORALZ Monte Carlo at AMY collaborations and made comparison to other generators. Analyzed 1 prong and 3 prong of τ events to measure cross section and charge asymmetry of $e^+e^- \rightarrow \tau^+\tau^-$ process at $\sqrt{s} = 58$ GeV. The results were reported at Korean Physical Society meeting and published in **Phys. Lett. B331, 227 (1994)**.

I have also participated in monitoring data acquisition and the AMY detector at KEK.

Teaching assistant of Korea University (Sep. 1993 - Dec. 1993)

Instructor in introductory undergraduate physics laboratory courses.

Teaching Assistant of Korea University (Mar. 1991 - Dec. 1991)

Instructor in electronics for juniors with physics major.

Conference talks & Professional activities

- XXXIII International Conference on High Energy Physics (ICHEP'06), Moscow, Russia, 2006; "W/Z+jets and Z p_T measurements at the Tevatron"
- 13th International Workshop on Deep Inelastic Scattering (DIS 05), Madison, Wisconsin, 2005; "W asymmetry and Z Rapidity measurements at Tevatron"
- CDF review ("Godparents") committee for "Inclusive Jet Cross Section using the Midpoint Clustering Algorithm"

- CMS LPC e-gamma workshop, Fermilab, Batavia, IL, 2004; “CDF experience for Simulation and Reconstruction”
- April meeting of the American Physical Society, Denver, CO, 2004; “Search for Charmed Pentaquark States at the Tevatron ppbar collider”
- April meeting of the American Physical Society, Denver, CO, 2004; “Rapidity distribution of Drell-Yan Dielectron pairs at CDF Run II”
- March, 2004 – February, 2005: A Co-leader of Jet Task Force at CDF
- March, 2004 – September, 2005: A Co-convenor of PentaQuark Task Force at CDF
- 19th International Workshop on Weak Interaction and Neutrinos, Lake Geneva, WI, USA, 2003; “Extra Gauge Bosons”
- CDF review (“Godparents”) committee for “A search for Large Extra Spacetime Dimensions in Diphotons and Drell-Yan”
- Invited talk at the Fall meeting of the Korean Physical Society, Korea, 2001; “CMS Hadron Calorimeter at the LHC”
- Fall Meeting of the Korean Physical Society, Korea, 1998; “Measurement of Ξc^0 Semileptonic Decays”
- Fall Meeting of the Korean Physical Society, Korea, 1995; “The E831 Hadron Calorimeter”
- Fall Meeting of the Korean Physical Society, Korea, 1992; “The Measurement of Cross Section and Charge Asymmetry of $e^+e^- \rightarrow \tau^+\tau^-$ process at $\sqrt{s} = 58$ GeV”
- The KEK annual Workshop, Japan, 1992; “The Measurement of Cross Section and Charge Asymmetry of $e^+e^- \rightarrow \tau^+\tau^-$ process at $\sqrt{s} = 58$ GeV”

Selected Publications (total ~380 scientific publications as of 9/1/2009)

“Measurement of $d\sigma/dy$ of Drell-Yan e^+e^- Pairs in the Z Mass Region from p anti-p Collisions at $\sqrt{s}=1.96$ TeV”, The CDF Collaboration. arXiv:0908.3914. Submitted to Phys. Rev. Lett. August 27 (2009).

“The CMS barrel calorimeter response to particle beams from 2 GeV to 350 GeV/c”, The USCMS Collaboration and ECAL/HCAL Collaboration”, Eur. Phys. J.C60 359-373 (2009).

“Search for Charged Higgs Bosons in Decays of Top Quarks in p anti-p Collisions at $\sqrt{s}=1.96$ TeV”, The CDF Collaboration, Phys. Rev. Lett. July 8 (2009).

“Direct Measurement of the W Production Charge Asymmetry in p anti-p Collisions at $\sqrt{s} = 1.96$ TeV”, The CDF Collaboration, Phys. Rev. Lett. 102 (2009).

“Design, performance, and calibration of CMS hadron-barrel calorimeter wedges”, The CMS HCAL Collaboration”, Eur. Phys. J. C55 159-171 (2008).

“New analysis technique to measure the W production charge asymmetry at the Fermilab Tevatron”, A. Bodek, Y. Chung, B.Y.Han, K. McFrrland, and E. Halkiadakis, Phys. Rev. D77 (2008).

“Determination of the jet energy scale at the collider detector at Fermilab” Y.S. Chung et al., NIM. A 566:375-412 (2006).

“Measurement of the forward-backward charge asymmetry from $W \rightarrow e \nu$ production in p anti-p collision at $s^{1/2} = 1.96$ TeV”, The CDF Collaboration, Phys. Rev. D 71, 051104 (2005).

“Measurement of the Forward-Backward Charge Asymmetry of Electron-Positron Pairs in p anti-p Collisions at $s^{1/2} = 1.96$ ”, The CDF Collaboration, Phys. Rev. D71, 052002 (2005).

“The Level-3 Trigger at the CDF experiment at Tevatron Run II”, Y.S. Chung *et al.* 2005. 5pp. IEEE Trans.Nucl.Sci.52:1212-1216,2005

“Reconstruction of Vees, Kinks, Ξ -s, and Ω -s in the FOCUS spectrometer”, The FOCUS collaboration, NIM. A484, 174 (2002).

“Measurement of $d\sigma/dM$ and forward backward charge asymmetry for high mass Drell-Yan e^+e^- pairs from ppbar collisions at $\sqrt{s} = 1.8$ TeV”, The CDF collaboration, Phys. Rev. Lett. 87, 131802 (2001).

“Measurement of $d\sigma/dy$ for high mass Drell-Yan e^+e^- pairs from ppbar collisions at $\sqrt{s} = 1.8$ TeV”, The CDF collaboration, Phys. Rev. D63, 011101 (2001).

“Measurement of Cascade C0 Semileptonic Decays”, Yeon Sei Chung, FERMILAB-THESIS-1999-58 (1999).

“Description and performance of the FOCUS (E831) Hadron Calorimeter”, Y.S.Chung et al,

NIM. A434, 271(1999).

“A Hadronic Tile Calorimeter Report”, Y.S.Chung et al, NIM. A409, 561 (1998).

“Measurement of Cross-Section and Charge Asymmetry for $e^+e^- \rightarrow \mu^+\mu^-$ and $e^+e^- \rightarrow \tau^+\tau^-$ at $s = 57.8 \text{ GeV}$ ”, The AMY Collaboration, Phys. Lett. B331, 227 (1994).